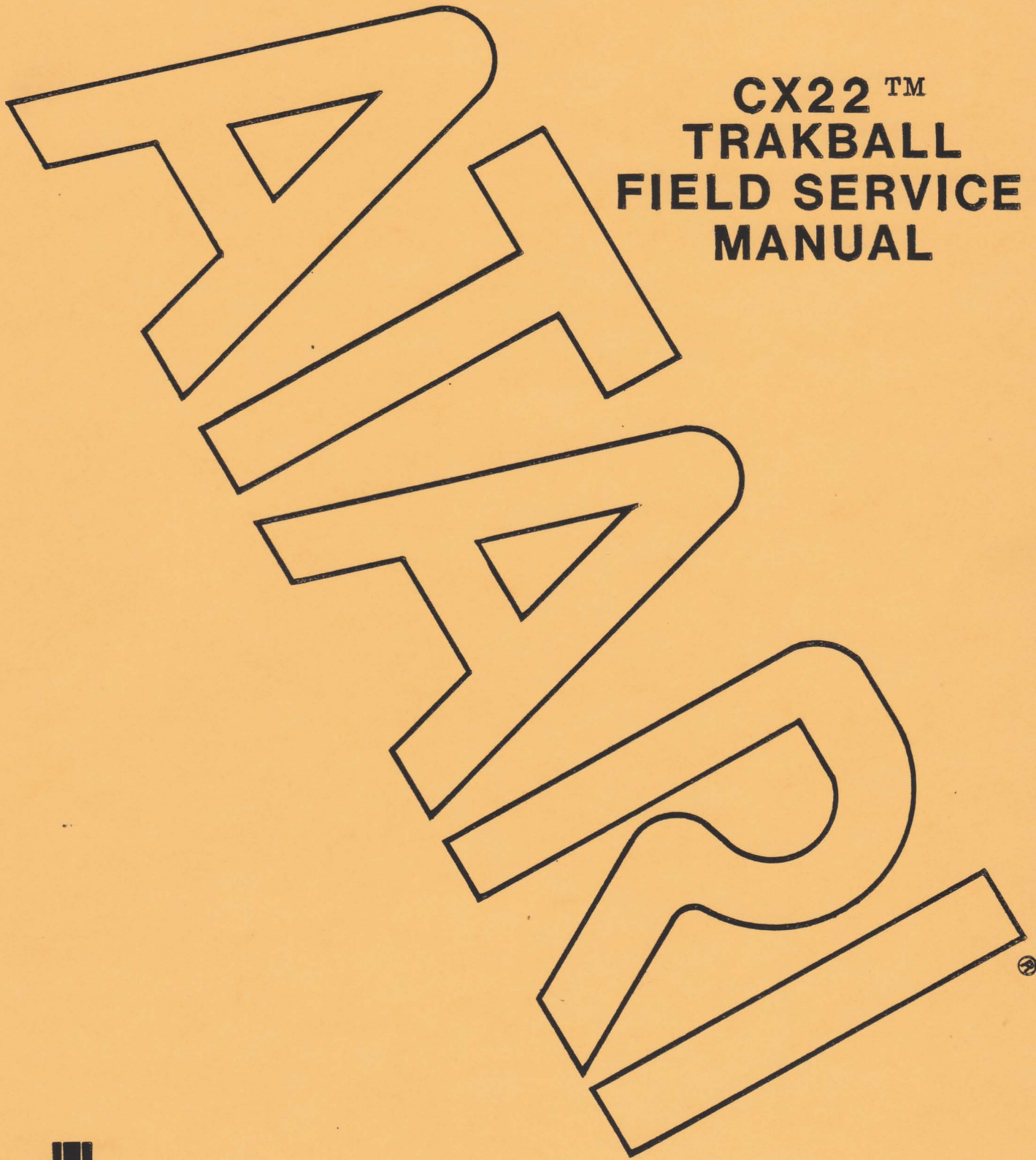




**CX22™
TRAKBALL
FIELD SERVICE
MANUAL**



 A Wamer Communications Company

FD100660

REV. 01

November 1983

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Published By:
ATARI, INC.
1265 Borregas Avenue
P.O. Box 427
Sunnyvale, California 94086

ATARI
CX22TM TRAKBALL
FIELD SERVICE MANUAL

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Correspondence regarding this document should be forwarded to Director of Technical Support, Consumer Product Service, Atari Incorporated, 1272 Borregas, Sunnyvale, California 94086.

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INTRODUCTION

The Atari CX22™ Trakball Field Service Manual is a reference guide for the service technician. The information presented in this manual, when used in conjunction with Atari training, enables you to repair and maintain the single mode/dual mode CX22 Trakball.

This Field Service Manual is organized in six sections:

- **THEORY OF OPERATION** - Overview of how the CX22 Trakball works and what its basic assemblies look like.
- **TESTING** - Review of tests available for diagnosing CX22 Trakball problems.
- **DISASSEMBLY/ASSEMBLY** - Procedures for disassembling and assembling the CX22 Trakball.
- **SYMPTOM CHECKLIST** - Failure information to aid in diagnosing CX22 Trakball problems.
- **DRAWINGS AND PARTS LIST** - Schematic, silkscreen, assembly drawings and a breakdown of parts used to repair the CX22 Trakball.
- **SERVICE BULLETINS** - Section to be used to hold Field Change Orders, Upgrade Bulletins and Tech Tips.

SECTION 1

THEORY OF OPERATION

The CX22 is a digital trakball controller which can be substituted for the joystick on several games. The CX22 is compatible with any Atari computer console or VCSTTM (except the CX5200TM).

There are two types of CX22 Trakballs:

- 1) A single mode trakball which is a joystick emulator (only 15K produced).
- 2) A dual mode trakball which has a mode select switch for both joystick emulation and true trakball operation.

The single mode and dual mode units are externally the same except for the mode select switch at the left of the Outer Case on the dual mode.

The CX22 is composed of an outer case which houses the main PC Board, two firebutton PC boards, two roller shaft assemblies, one idler shaft assembly and a cue ball. Refer to Figure 1-1 as reference for the following discussion of trakball parts.

Outer Case

The outer case consists of a top and a bottom plastic housing which are held together by four phillips-head screws.

Top Housing

The top housing provides the following (visible from the outside):

- an opening in the center for the cue ball
- two firebuttons (for use by either right-handed or left-handed players)

Bottom Housing

The bottom housing provides:

- an opening in the rear for the interface cable
- an opening in the side for the joystick/trakball mode select switch
- the main PC Board
- two firebutton PC Boards
- two roller shaft assemblies each consisting of:
 - a roller shaft
 - two bearings
 - a slotted encoding wheel
- an idler shaft assembly
- a cue ball

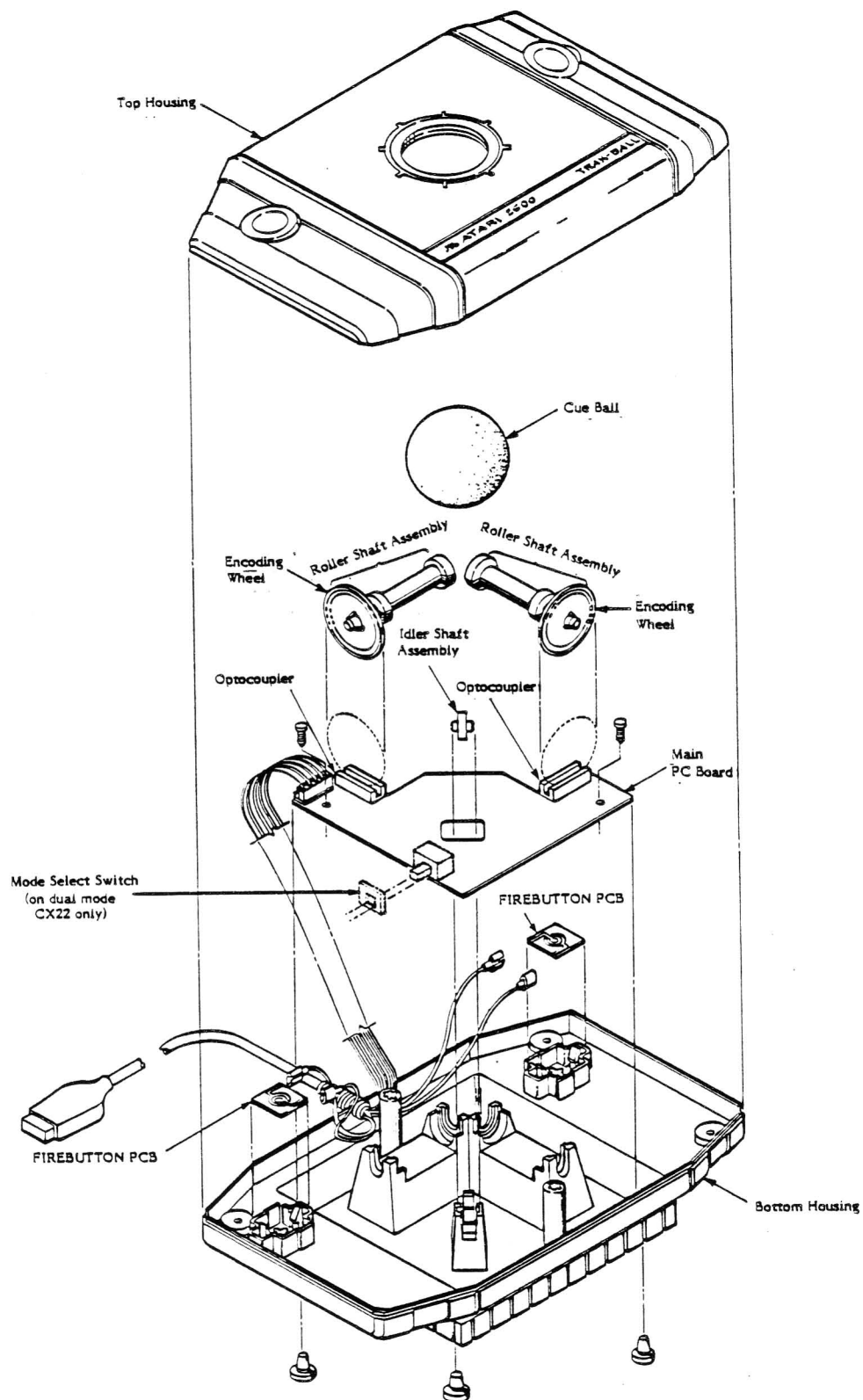


Figure 1-1. CX22 Trakball Final Assembly

THEORY OF OPERATION

NOTE: Refer to the single mode schematic to understand the circuit operation for the joystick emulation mode of both the single and dual mode CX22. Since both X and Y Axis operation are identical, the following explanation will refer to the X Axis only.

As the ball is rotated, the encoding wheel alternately passes and blocks infrared light which is emitted from one side of the optocoupler toward the detector on the other side. Each optocoupler has two detectors which are 90 degrees apart in relation to one cycle of a window on the encoding wheel. This produces two waveforms which are 90 degrees out of phase with each other. These waveforms are then fed to the voltage comparator (A1). A1 cleans up the waveforms into 5V squarewaves.

The 5V squarewaves are then fed to the D flip-flop (A2). A2 determines direction. When the ball is rotated to the right, the rising edge of the "clock 1" input signal is leading the "D1" input signal by 90 degrees. This causes the $\bar{Q}$ (RIGHT) output of A2 to go high. Conversely, when the ball is rotated to the left, the rising edge of the "clock 1" input signal is lagging the "D1" input signal by 90 degrees. This causes the Q (LEFT) output of A2 to go high.

The direction outputs of A2 are then fed to the final output gates (A4) which invert the outputs to allow proper interpretation of direction by the VCS/computer console.

A3 acts as a motion sensor. When the ball is rotated either left or right, an "X" clock" signal is fed to the + trigger input of A3. This causes the Q1 output of A3 to go high, thus enabling the final output gates (A4). As long as the ball is in motion, the final output gates are enabled. When ball motion ceases, the Q1 output of A3 returns to its static (LOW) state, thus disabling the final output gates (A4).

NOTE: Refer to the dual mode schematic for the remainder of the Theory of Operation.

Joystick emulation circuit operation for the dual mode CX22 is identical to that of the single mode CX22 with the following exceptions:

Select gate (A5) and S1 were added to enable the user to choose between joystick emulation and "true" trakball operation. The direction signals from the final output gates (A4) are fed to the A1-A4 inputs of A5.

When S1 is in the "joystick" position the A1-A4 inputs are selected and passed to the D1-D4 outputs.

When S1 is in the "trakball" position the B1-B4 inputs of A5 are selected and passed to the D1-D4 outputs. When in the trakball mode, X direction is determined by the $\bar{Q}$ output (pin 2) of A2. X motion and speed is determined by the "X Clock" output of A1. Y direction is determined by the Q output (pin 13) of A2. Y motion and speed is determined by the "Y clock" output of A1.

Refer to Table 1-1 for final outputs of the CX22 as they correspond to the input (9-pin player port) of the VCS or computer console.

TABLE 1-1

TRAKBALL OUTPUTS/PIN CONNECTIONS

		S1 Position	
J1 (PCB)	9-Pin Player Port	Joystick Mode	Trakball Mode
4	1	Up	X Direction (High=Right;Low=Left)
3	2	Down	X Motion
6	3	Left	Y Direction (High=Down;Low=Up)
5	4	Right	Y Motion

SECTION 2

TESTING

Equipment Needed:

- a known good Atari computer console (CPU) or VCS (except the CX5200)
- a Missile CommandTM cartridge
- a TV set, properly adjusted
- a 15 MHz oscilloscope

Mechanical Test:

Verify that the ball will spin freely and smoothly in all directions. There should be no excessive noise or vibration. If the ball will not spin freely or is excessively noisy, refer to Symptom Checklist, Page 4-1.

Trakball and Firebutton Test:

If a failure occurs, refer to the Symptom Checklist (pg 4-1) for troubleshooting instructions. Repeat the Test Procedure after unit has been repaired.

1. Plug the Trakball into the left controller port of the Atari VCS or the #1 controller port of the Atari CPU.
2. Insert the Missile Command cartridge into the VCS/CPU.
3. Turn the VCS/CPU on and start the game.
4. By rotating the ball, verify that the cursor (crosshairs) can be moved in any direction.
5. To test for Directional Dropouts, move the cursor to the right border of the screen. Spin the ball as fast as possible by hand in the right direction. While you are spinning the ball to the right, the cursor should remain on the right border.

Repeat this test for the left, up and down directions.

6. Verify that a missile fires each time either of the firebuttons is pressed. Be sure to test both left and right firebuttons.

Trakball Mode Test (Dual Mode Only)

1. Remove top housing.
2. Put S1 in trakball position.
3. Refer to Table 2-1 for the proper outputs of A5 when the ball is spun left, right, up, or down.

TABLE 2-1
A5 OUTPUTS

A5 pin #	Outputs
10	Square wave when ball is spun up or down
11	+5V when ball is spun down; 0V when ball is spun up
12	Square wave when ball is spun left or right
13	+5V when ball is spun right; 0V when ball is spun left

SECTION 3

DISASSEMBLY/ASSEMBLY

Use the following six steps to avoid unnecessary marring of the CX22 case and also for ease of disassembly.

Top/Bottom Housing

- 1) Turn the housing upside down on a soft, protected surface.
- 2) Remove the screws from each corner of the unit; there are four (See Figure 3-1).
- 3) Insert a screwdriver (Phillips-head or flat-Head) into one of the two support post holes in the bottom housing (See Figure 3-1).
- 4) Turn the unit right side up and rest the handle of the screwdriver against a solid surface.
- 5) Carefully press down on the ball until the edges of the top and bottom housings become separated.
- 6) Repeat steps 3) thru 5) in the other support post hole.

To reassemble the CX22, align the top and bottom housings and press together. Now, insert and tighten the four screws removed in 1), above.

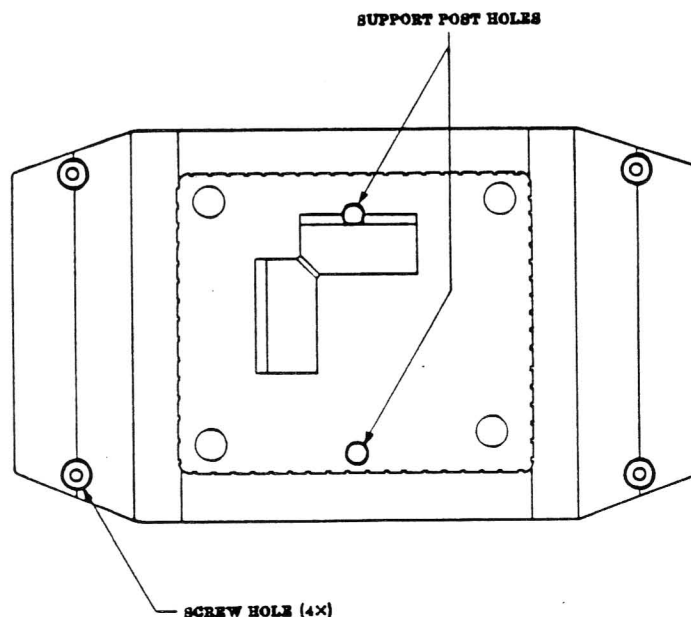


Figure 3-1. CX22 Bottom Housing
(Bottom View)

SECTION 4
SYMPTOM CHECKLIST

SINGLE MODE

Mechanical Failures

<u>SYMPTOM</u>	<u>POSSIBLE CAUSE</u>
Noisy operation or ball won't spin freely.	Dirty roller and/or idler shafts, worn bearings, warped encoding wheels, damaged cue ball (See Pg. 4-4 for repair or replacement procedures).

Electrical Failures - General

<u>SYMPTOM</u>	<u>POSSIBLE CAUSE</u>
Cursor will not move at all.	A1-A4, L1 open, cable assembly, C7 shorted.
Firebutton failure.	Firebutton PC Board, spring, cable assembly.
Snowy screen when trakball is plugged in.	C1-C2 shorted, A1-A4 shorted

Electrical Failures - Left/Right

<u>SYMPTOM</u>	<u>POSSIBLE CAUSE</u>
Cursor won't move left or right.	U1, A1-A4, C5 open, C3 shorted, cable assembly.
Cursor moves only to the left or only to the right.	U1, A1, A2, A4, cable assembly.
Cursor moves to the left and right OK, but continues to move after ball motion has stopped.	A3, C5 shorted, pin 6 of A3 shorted to +5V.
Directional Dropouts	U1 (Output amplitude must be 450MV p-p min, 2.5V p-p max.), PC Board not seated properly.

Electrical Failures - Up/Down

<u>SYMPTOM</u>	<u>POSSIBLE CAUSE</u>
Cursor won't move up or down.	U2, A1-A4, C6 open, C4 shorted, cable assembly.
Cursor moves only up or only down.	U1, A1, A2, A4, cable assembly.
Cursor moves up and down OK, but continues to move after ball motion has stopped.	A3, C6 shorted, pin 10 of A3 shorted to +5V.
Directional Dropouts	U2 (Output amplitude must be 450MV p-p min, 2.5V p-p max.), PC Board not seated properly.

DUAL MODE

Mechanical Failures

<u>SYMPTOM</u>	<u>POSSIBLE CAUSE</u>
Noisy operation or ball won't spin freely.	Dirty roller and/or idler shafts, worn bearings, warped encoding wheels, damaged cue ball (See Pg. 4-4 for repair or replacement procedures).

Electrical Failures - General

<u>SYMPTOM</u>	<u>POSSIBLE CAUSE</u>
Cursor will not move at all.	A1-A5, L1 open, cable assembly, C7 shorted.
Firebutton failure.	Firebutton PC Board, spring, cable assembly.
Snowy screen when trakball is plugged in.	C1, 2, A1-A5.
Erratic cursor movement.	S1, A5.
Trakball mode failure.	S1, A5.

Electrical Failures - Left/Right

<u>SYMPTOM</u>	<u>POSSIBLE CAUSE</u>
Cursor won't move left or right.	U1, A1-A5, C5 open, C3 shorted, cable assembly.
Cursor moves only to the left or only to the right.	U1, A1, A2, A4, A5, cable assembly.
Cursor moves to the left and right OK, but continues to move after ball motion has stopped.	A3, C5 shorted, pin 6 of A3 shorted to +5V.
Directional Dropouts.	U1 (Output amplitude must be 450MV p-p min, 2.5V p-p max.), PC Board not seated properly.

Electrical Failures - Up/Down

<u>SYMPTOM</u>	<u>POSSIBLE CAUSE</u>
Cursor won't move up or down	U2, A1-A5, C6 open, C4 Shorted, cable assembly.
Cursor moves only up or only down.	U1, A1, A2, A4, A5, cable assembly.
Cursor moves up and down OK, but continues to move after ball motion has stopped.	A3, C6 shorted, pin 10 of A3 shorted to +5V.
Directional Dropouts.	U2 (Output amplitude must be 450MV p-p min, 2.5V p-p max.), PC Board seated properly.

MECHANICAL REPAIRS

- Clean dirty ball, roller shafts, and idler bearings with isopropyl alcohol and a soft cloth.
- Replace defective bearings (see procedure below for replacing inner roller shaft bearing).
- Replace damaged cue ball.
- Replace badly warped encoding wheels (See procedure below).

Encoding wheel and inner roller shaft bearing replacement procedure

- 1) Clip the three retaining tabs of the encoding wheel with wire cutters.
- 2) Remove the encoding wheel.
- 3) Replace the defective bearing.
- 4) Attach new encoding wheel.

SECTION 5

DRAWINGS AND PARTS LIST

This section contains silkscreens, schematics, assembly drawings and a breakdown of parts for the CX22 single mode/dual mode trakball.

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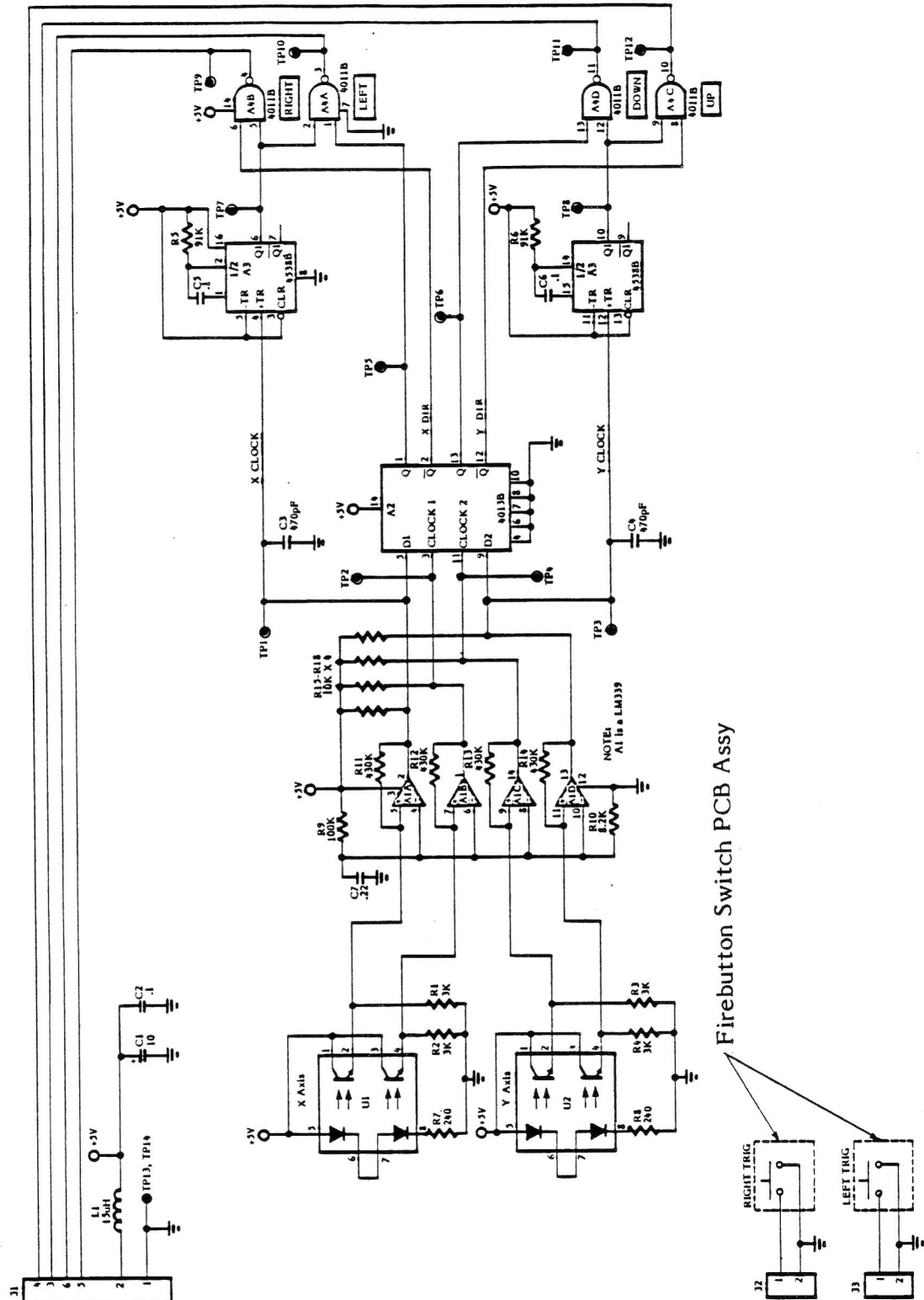


Figure 5-1. CX22 Single Mode Schematic

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Figure 5-3. CX22 Dual Mode Schematic

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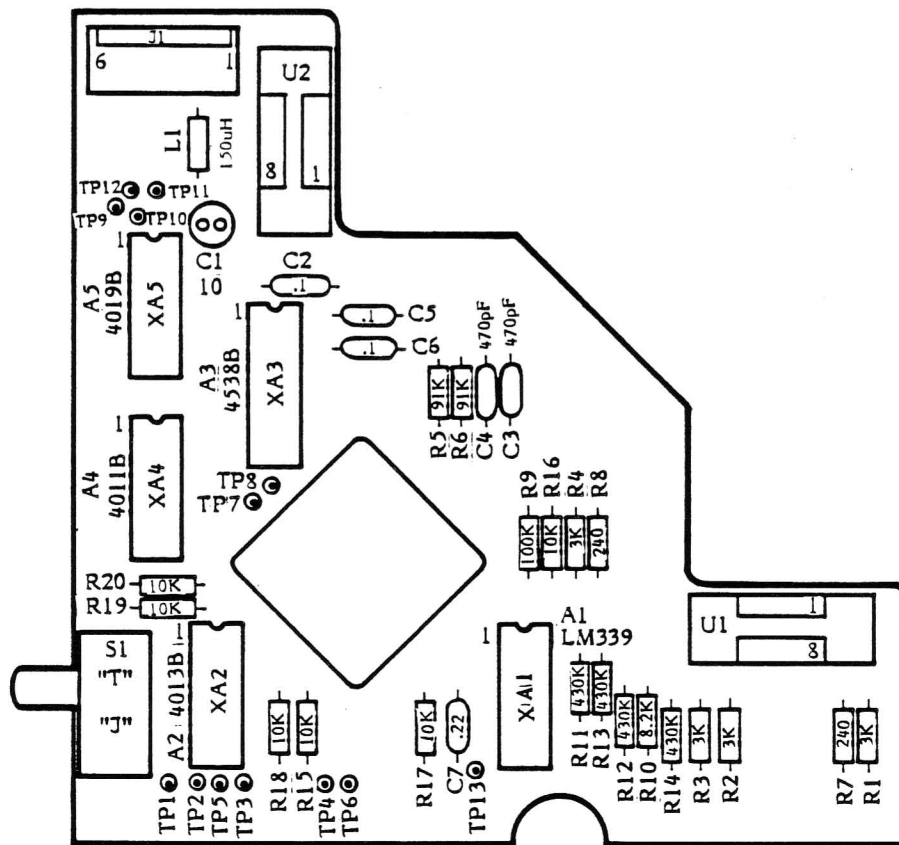


Figure 5-4. CX22 Dual Mode Silkscreen

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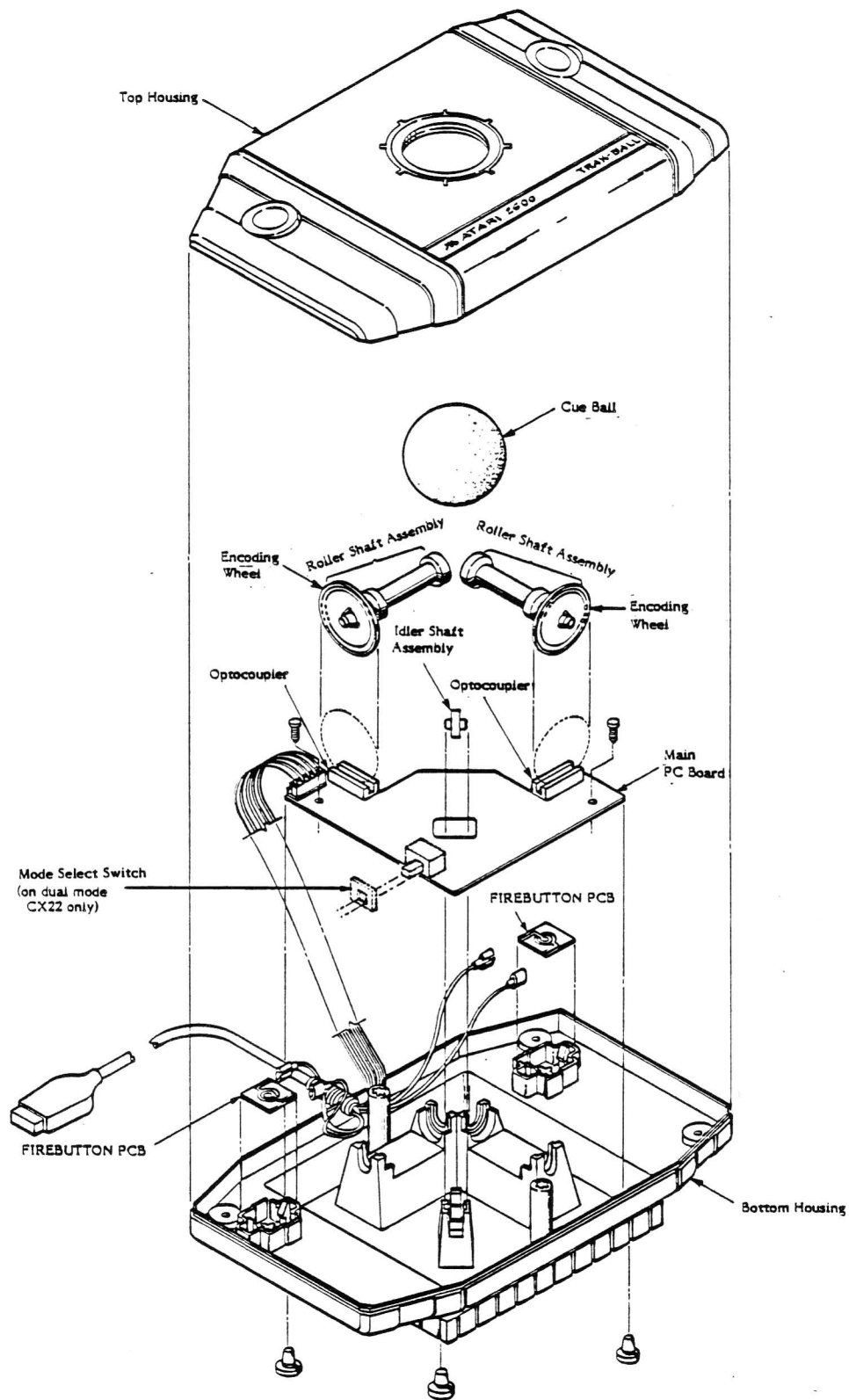


Figure 5-5. CX22 Final Assembly

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PARTS LIST

<u>Item No.</u>	<u>Location</u>	<u>Description</u>	<u>Part Number</u>
1		Trakball Assembly	CA024208-001
2		Top Housing Assembly (Brown)	CA024552-001
3		Top Housing Assembly (Black)	CA020567
4		Bottom Housing (Buff)	C020563-002
5		Bottom Housing (Black)	C020563
6		Shield, Switch	C024290-01
7		Foot, Rubber	88-1006
8		Encoding Wheel	C020571-002
9		Bearing	C020190
10		Idler Shaft Assembly	CA020582
11		Ball (Brown)	C024375-001
12		Ball (Brown) (Alternate for C024375-001)	C020191-002
13		Ball (White)	C020191
14		Firebutton	C020564-002
15		Spring, Firebutton	C020565
16		PCB Switch Assembly	CA020560
17		Cable Assy, 7 wire	CA020566
18		Lower PCB Assy	CA024205-01
19	C1	Cap, Electrolytic radial, 10uF, 16V	C014392
20	C2	Cap, Ceramic Axial, .1uF 50V	C014181-03
21	C3, 4	Cap, Ceramic Axial, 470pF 50V	C014180-07
22	C5, 6	Cap, mylar radial .1uF 100V	C017885
23	C7	Cap, Ceramic Axial, .22uF, 50V	C014181-05
24	L1	Inductor, axial 150uH	C017948-01
25	U1, 2	Optocoupler	C020290
26	R1-4	Resistor, 3K, 1/4W	14-5302
27	R5, 6	Resistor, 91K, 1/4W	14-5913
28	R7, 8	Resistor, 240, 1/4W	14-5241
29	R9	Resistor, 100K, 1/4W	14-5104
30	R10	Resistor, 8.2K, 1/4W	14-5822
31	R11-14	Resistor, 430K, 1/4W	14-5434
32	R15-20	Resistor, 10K, 1/4W	14-5103
33		Socket, I.C., 14 pin	C014386-02
34		Socket, I.C., 16 pin	C014386-03
35	S1	Switch, SPDT Slide, PCB Mount	C019702
36	J1	Wafer connector, 6 pin	C020461-06
37	A1	I.C., LM339	C015950
38	A2	I.C., 4013B	C014334
39	A3	I.C., 4538B	C020478
40	A4	I.C., 4011B	C014333
41	A5	I.C., 4019B	C011512

SECTION 6

SERVICE BULLETINS

This section is to be used by you to file the three classifications of service bulletins that are periodically released by the Director of Technical Support.

The following are brief descriptions of each classification:

FIELD CHANGE ORDER

A Field Change Order describes mandatory hardware or software changes to ATARI products and instructs how to implement these changes. The changes must be performed on all units serviced or repaired.

UPGRADE BULLETIN

An Upgrade Bulletin describes product improvements or modifications that the consumer may wish to purchase. These bulletins allow you to modify the customer's unit to add capabilities which may not have been available when the unit was originally manufactured.

TECH TIP

A Tech Tip is a document of a general nature which transmits routine service or repair information. By communicating methods developed since you attended training classes, Tech Tips aid to continuously improve repair skills and increase knowledge of ATARI products.

Other times, Tech Tips alert you to units that have been modified and are now standard for ATARI Manufacturing, but are different from many existing units and require different repair techniques.



Consumer Product Service
Manager of Tehnical Support
FIELD CHANGE ORDER number **1A**

MODEL:2600A ATARI Video Computer System

DATE: July 19, 1982

SUBJECT:

Changing 12V radial lead capacitors at C241 and C242.

DESCRIPTION:

Some capacitors for these locations are not rated at an acceptable voltage. The incorrect capacitors are 12 volt radial lead type (see Figure 1). An easy way to identify a problem at C241 or C242 is to look at the screen with the diagnostic cartridge running COLOR BAR. The color is very grainy with faint vertical bars. (COLOR BARS look like COLOR SQUARES.)

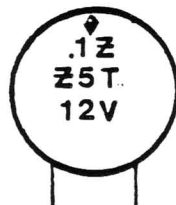


Figure 1. Incorrect Capacitor

PARTS:

<u>LOCATION</u>	<u>OLD PART NUMBER</u>	<u>REPLACE WITH PART NUMBER</u>	<u>DESCRIPTION</u>
C241	2C-001	21-101104	.1uf Axial Lead Polycap - 100v
C242	2C-001	C014181-03	.1uf Axial Lead Ceramic - 25v

INSTALLATION PROCEDURES:

Desolder and remove 2C-001 from C241. Insert and solder 21-101104 into C241.

Desolder and remove 2C-001 from C242. Insert and solder C014181-03 into C242.

TESTING PROCEDURES:

Use standard testing procedures as outlined in the 2600/2600A Field Service Manual (C018040).



Consumer Product Service
Manager of Tehnical Support
FIELD CHANGE ORDER number _____

MODEL: 2600A ATARI Video Computer System

DATE:

PRIORITY LEVEL:

Mandatory on all 2600As received for service that have 12 volt capacitors in either C241 or C242. Replace all 12V capacitors at C241 and C242 even if no symptoms of failure are apparent.

DIFFICULTY REPORTING:

If you have any problems or questions concerning the implementation of this Field Change Order, contact the ATARI Tech Line Specialist.

Inside California
(800) 672-1466

Outside California
(800) 538-1535



Consumer Product Service
Manager of Tehnical Support
FIELD CHANGE ORDER

VCS
3

number

MODEL: ATARI 2600 Video Computer System

DATE: July 26, 1982

SUBJECT:

Zener Diode/Axial Capacitor Assembly (CA018263)

DESCRIPTION:

To reduce static damage to the Hex Buffer and other components, the Zener/Axial assembly must be placed between the trigger lines and ground. Also, static strips must be placed on the switches of the switchboard. (Refer to pages 3-3 thru 3-5 of your ATARI VIDEO COMPUTER FIELD SERVICE MANUAL, DOMESTIC MODEL 2600/2600A.)

The part number for the Zener Diode/Axial Capacitor Assembly is CA018263 and can be ordered (**at no charge to you**) from Sales Order Processing, Sunnyvale, at this time.

You should have the static strips (Part Numbers C017294 and C017297) in current parts inventory. If you do not, please order them when you order the Zener/Axial Assembly.

TESTING PROCEDURES:

Use standard testing procedures as outlines in the Field Service Manual.

PRIORITY LEVEL:

This Field Change Order is to be performed on all units opened for repair.

DIFFICULTY REPORTING:

If you have any problems or questions concerning the implementation of this Field Change Order, contact the ATARI, Techline Specialist.

Inside California
(800)672-1466

Outside California
(800)538-1535



Consumer Product Service
Manager of Technical Support
UPGRADE BULLETIN

UB
VCS
01

number

MODEL: Atari CX5200 Supergame (PCB CA018087)

DATE: July 7, 1983

SUBJECT:

PCB Retrofit to allow use of Atari VCSTM Cartridge Adaptor

UPGRADE DESCRIPTION:

Applies only to CX5200 PCB, P/N CA018087. Allows use of the new Atari VCS Cartridge Adaptor (CX55). All other CX5200 PCB's have the retrofit components built into them and require no modification to accommodate the adaptor.

INSTALLATION PROCEDURE:

Use attached retrofit procedure.

TESTING PROCEDURE:

As outlined in retrofit procedure.

DIFFICULTY REPORTING:

If you have questions or need further assistance, call the Atari Techline Specialist.

Inside California
(800) 672-1466

Outside California
(800) 538-1535

VCS CARTRIDGE ADAPTOR PCB

RETROFIT PROCEDURE

1. Remove the top cover of the CX5200.
2. Verify that the PCB Part Number is CA018087. (If it is not this number, there is no need for the modification. Reinstall cover, insert adaptor, go to step 13 and test.)
3. Remove both the top and bottom PCB shields.
4. Using either an X-ACTO knife or a Dremel tool (150 Bit), isolate Pin 24 of J1 from ground by making a "V" or "U" shaped cut in the trace on the component side of the PCB (See Figure 1). Be careful not to isolate Pins 23 and 25 from ground.

IT IS EXTREMELY IMPORTANT THAT PIN 24 OF J1 BE COMPLETELY ISOLATED FROM GROUND.

Use an Ohm Meter to verify that Pin 24 has been isolated from ground.

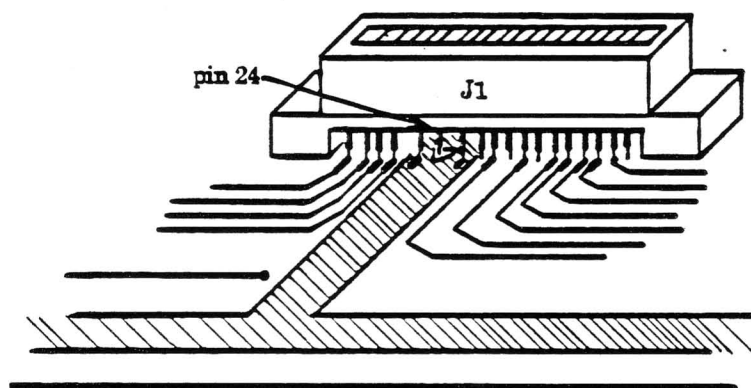


Figure 1. Pin 24 Isolation.

5. If the kit has not already been pre-formed (see Figure 2), use needle-nosed pliers and wire cutters to pre-form the kit. Use Figure 2 as a reference.

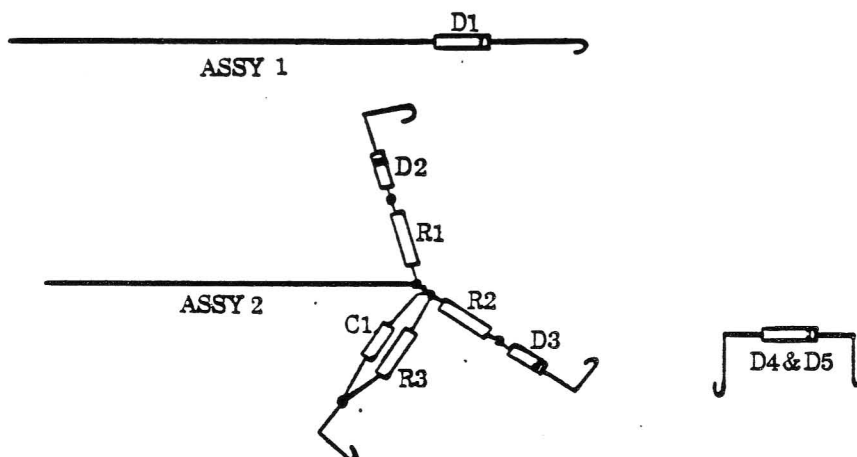
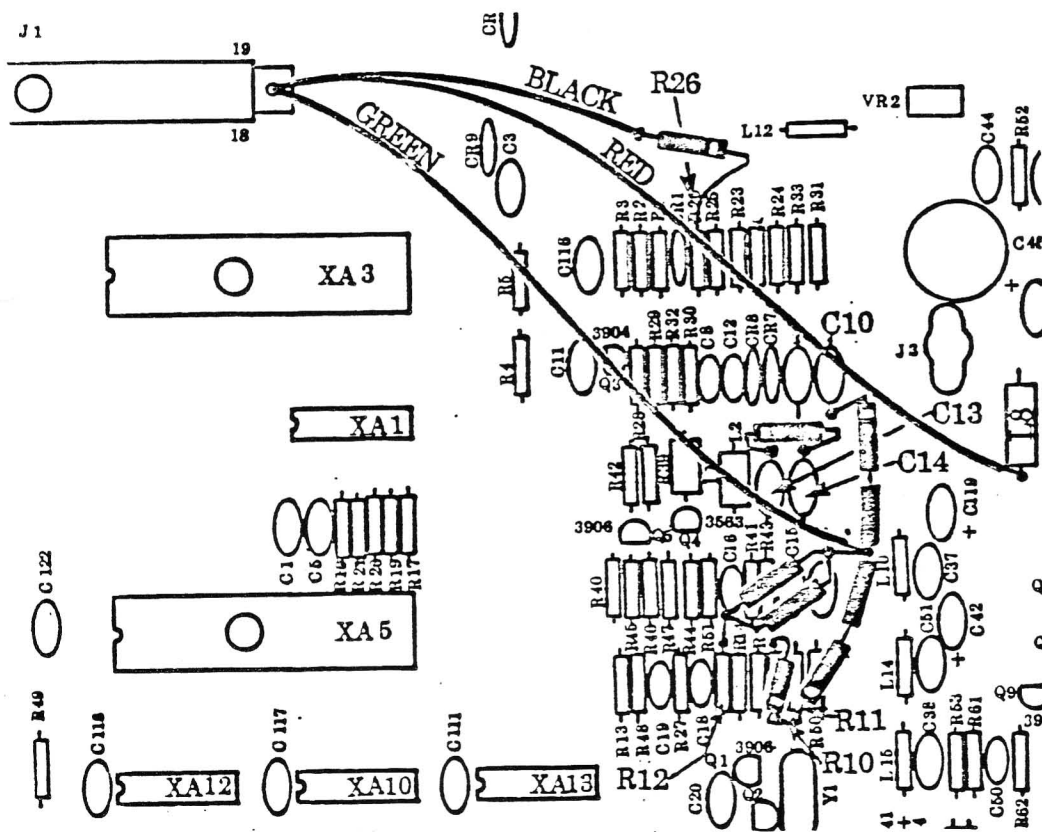


Figure 2. Pre-form Assembly

Using Figure 3 as a reference perform the following:

- A. Solder cathode of D1, Assembly 1 to R26.
- B. Pass Assembly 1 wire, (BLACK) through hole in J1.
- C. Solder cathode of D4, to C13.
- D. Solder anode of D4, to C14.
- E. Solder D5 to R10 (Note polarity).
- F. Solder cathode of D2, Assembly 2 to C10.
- G. Solder cathode of D3, Assembly 2 to R11.
- H. Solder R3, and C1, Assembly 2 to R12.
- I. Pass Assembly 2 wire (GREEN) through hole in J1.
- J. Solder one end of RED jumper wire to L8.
- K. Pass RED jumper wire through hole in J1.



7. Using Figure 4 as a reference, perform the following:

- A. Solder Assembly 1 wire (BLACK) to Pin 24 of J1.
- B. Solder Assembly 2 wire (GREEN) to Pin 30 of J1.
- C. *Solder RED jumper wire to Pin 11 of J1.

NOTE: Be sure to leave enough slack in the wires to allow reassembly of the shield.

*****CAUTION*****

After soldering, use an Ohm Meter to make sure that no solder bridges or shorts were formed adjacent to Pins 11, 24, and/or 30 of J1.

*****CAUTION*****

* = Take extra care to avoid connecting the RED wire to any ground pins. If the RED wire is grounded, the 5200 Power Adaptor will burn out.

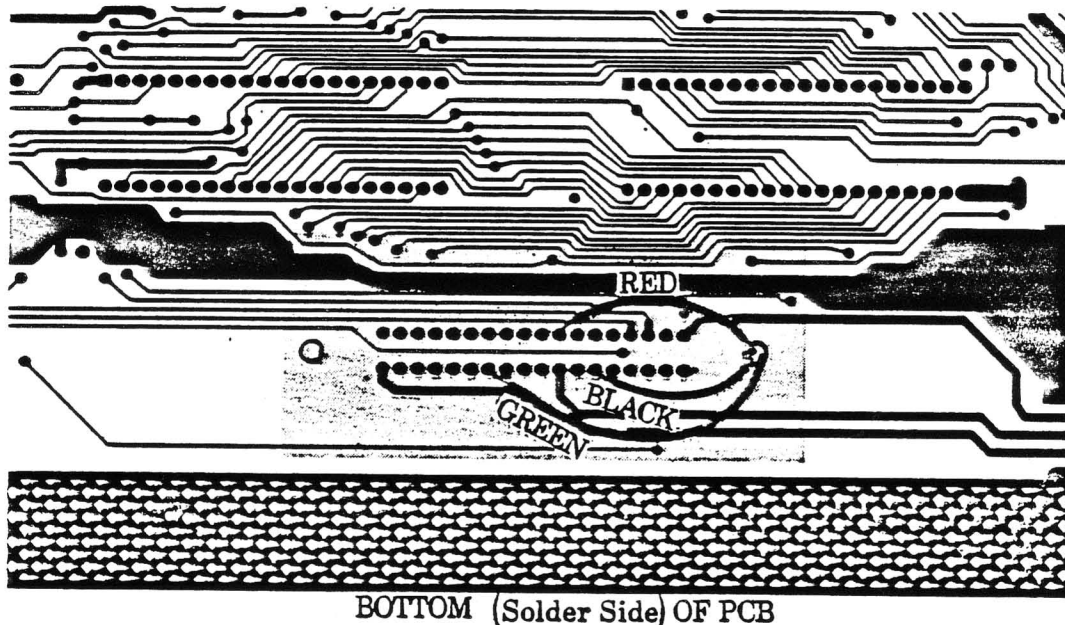


Figure 4. Wire Connection Diagram.

- 8. Place the top housing face down on the workbench.
- 9. Using needle-nosed pliers, grasp the pin indicated in Figure 5, and twist it off.
- 10. Before reassembling the unit, place the PCB into the bottom housing and replace the top housing. DO NOT SECURE HOUSINGS.
- 11. Using the 1.1 Diagnostic Cartridge perform a quick check to ensure that the modifications did not affect the performance of the unit. If the unit fails, return to the modification procedures, and make certain that all steps were fully and completely performed. The modifications will not affect game play or the unit's performance.
- 12. Turn off the unit.

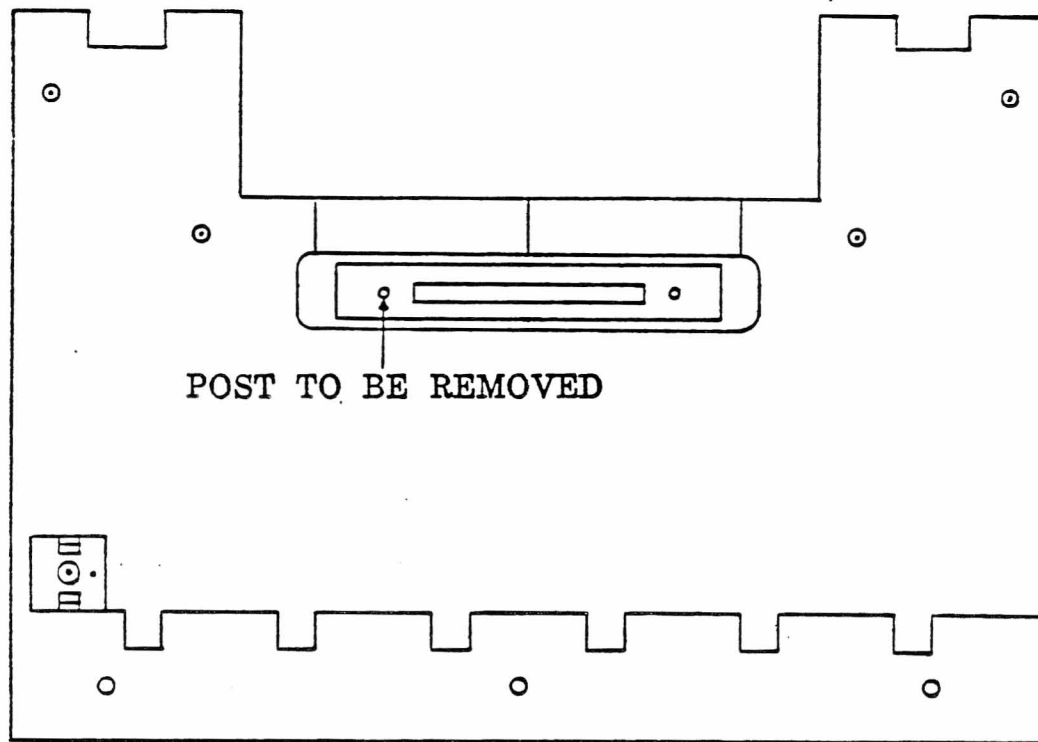


Figure 5. Top Cover Pin Removal

13. Remove the Diagnostic Cartridge and install the Cartridge Adaptor.
14. Use the 2.6 Diagnostic Cartridge to perform a quick check to ensure that the adaptor is functional.
15. If the adaptor does not function properly, step through the modification procedures to ensure that all modifications were completely and correctly performed.
16. If all modifications were installed correctly and the Cartridge Adaptor does not function properly, use a DVM to determine which retrofit component or assembly is defective.
17. Replace the defective component or assembly.
18. Completely reassemble the unit, using the screws removed in Step 1 to secure the two housings together.



Consumer Product Service
Manager of Tehnical Support
TECH TIP

number 2

MODEL: CX2800

DATE: 11/17/82

SUBJECT:

Blanking Resistor

DESCRIPTION:

The Rev. 4 CX2800 PCB has an 820 Ohm resistor soldered across pins 6 and 9 of U2 (TIA) on the soldered side (bottom). This resistor improves the game color and must not be removed. Rev. 5 and above CX2800 PCB have this resistor incorporated in their design.

DIFFICULTY REPORTING:

If you need further clarification concerning this Tech Tip, call the ATARI Tech-Line Specialist.

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Consumer Product Service
Manager of Tehnical Support
TECH TIP

number 3

MODEL: CX2800

DATE: 11/17/82

SUBJECT:

Switchcaps

DESCRIPTION:

If at power-up two switches are activated at the same time (indicated by both the Joystick and Paddle, or Novice and Expert LED's "on" at the same time), you must shorten the switchcap hand ends with sand paper, to eliminate binding.

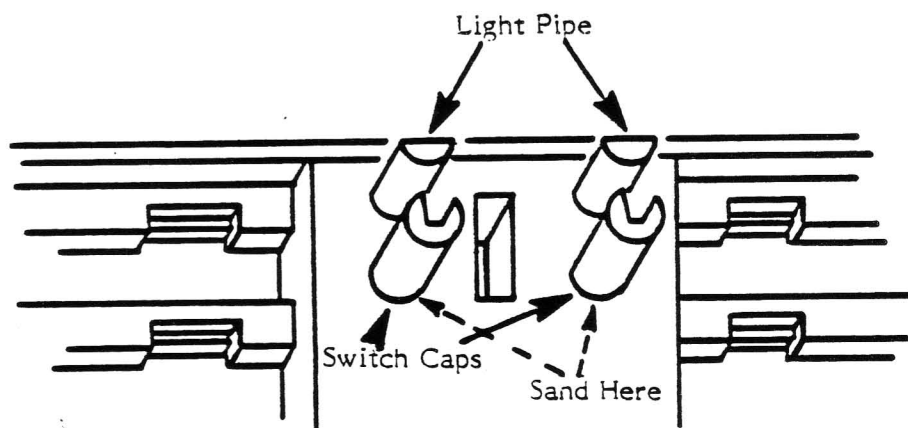
If the switchcaps seem to be binding when activated on Rev. 4 PCBs, tilt the momentary switches (S2-S9) toward the player port side of the board so that there is a .030 inch gap between the board and the leading edge of the switch bottom (a manual approximation is usually successful). Some Rev. 4 PCB's have a shim glued to the PCB to correct this problem.

DIFFICULTY REPORTING:

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Consumer Product Service
Manager of Technical Support
TECH TIP

number 4

MODEL: 2600A

DATE: 11/17/82

SUBJECT:

Blanking Resistor

DESCRIPTION:

Some 2600A PCBs have an 820 1/4 W 5% resistor (P/N 14-5821) installed on the solder side (bottom). The resistor is located between pins 6 and 9 of A201 (TIA) and improves the color reproduction of the unit.

The resistor may be added to existing 2600A units at your discretion and the customer's expense. The addition will result in improved color saturation.

Rev. 16 PCBs and above will have the resistor incorporated into their design.

DIFFICULTY REPORTING:

If you need further clarification concerning this Tech Tip, call the ATARI Tech-Line Specialist:

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Consumer Product Service
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TECH TIP

number 5

MODEL: CX2800

DATE: 11/17/82

SUBJECT:

Switch Shorting

DESCRIPTION:

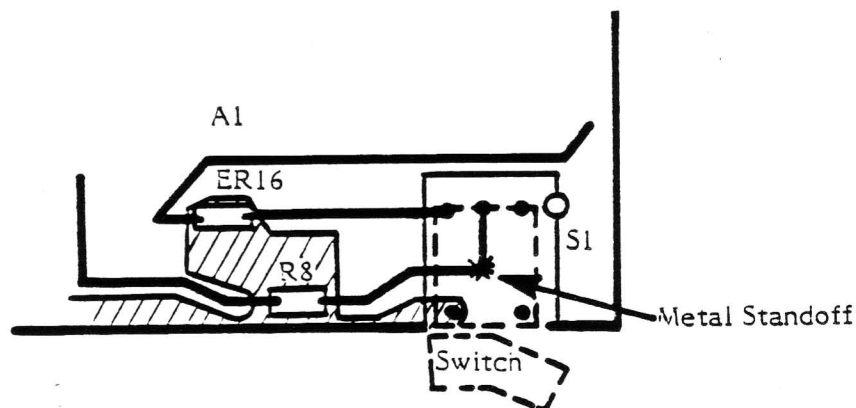
The Rev. 4 CX2800 PCB switch S1 (On/Off) has a metal standoff that may short to the trace beneath the switch. To prevent shorting, place a small piece of insulating tape on the board beneath the switch. PCB to Rev. 4 and above have the traces rerouted.

DIFFICULTY REPORTING:

If you need further clarification concerning this Tech Tip, call the ATARI Tech-Line Specialist:

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Consumer Product Service
Manager of Tehnical Support
TECH TIP

number 6

MODEL: ATARI CX5200

DATE: 11/17/82

SUBJECT:

CX5200 Power Adaptor

DESCRIPTION:

Do not use an HCD Power Adaptor with the CX5200 as it will damage both the HCD Power Adaptor and the CX5200 Switchbox.

The proper Power Adaptor to use with the CX5200 is:

CX521 AC/DC Power Adaptor, Part Number C018187

Output: 9.3 volts DC at 1.95 A.

TROUBLESHOOTING AND MAINTENANCE:

N/A

TESTING PROCEDURES:

N/A

ENCLOSURES:

N/A



Consumer Product Service
Manager of Tehnical Support
TECH TIP

VCS
number 7

MODEL: CX5200

DATE: 1/20/83

SUBJECT:

Defective Rockwell 6502 MPU on CX5200 PC Board.

DESCRIPTION:

Rockwell MPUs with date code of 8250 and later (stamped with the letters RC) have a timing defect.

A factory modification adds an R-C network on the component side of the CX5200 PC Board at IC U14A (pin 1) and U6A (pin 4) (see Figures 1 and 2).

Note: You do not need to remove this network to use any other manufacturer's MPU or a Rockwell MPU with a different date code.

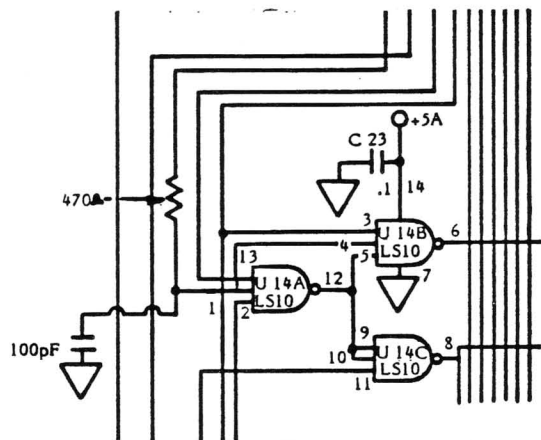


Figure 1. CX5200 Schematic (R-C Network)

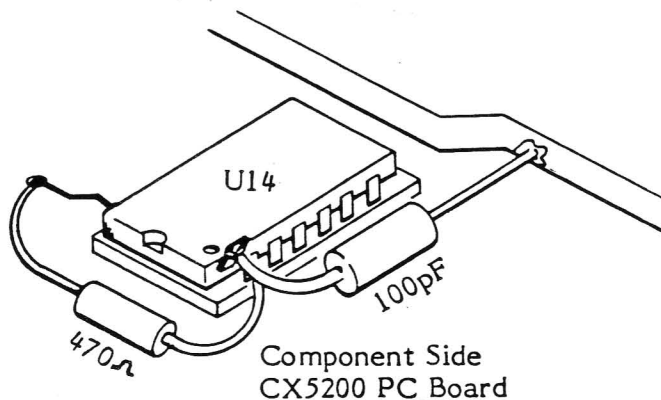


Figure 2. Factory Modification



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TECH TIP

VCS
number 7CON

MODEL: CX5200

DATE: 1/20/83

If you are installing an RC stamped 6502 on a CX5200 PC Board which has not had the factory modification added to the component side:

Add an R-C network to the solder side of the PC Board (See Figure 3).

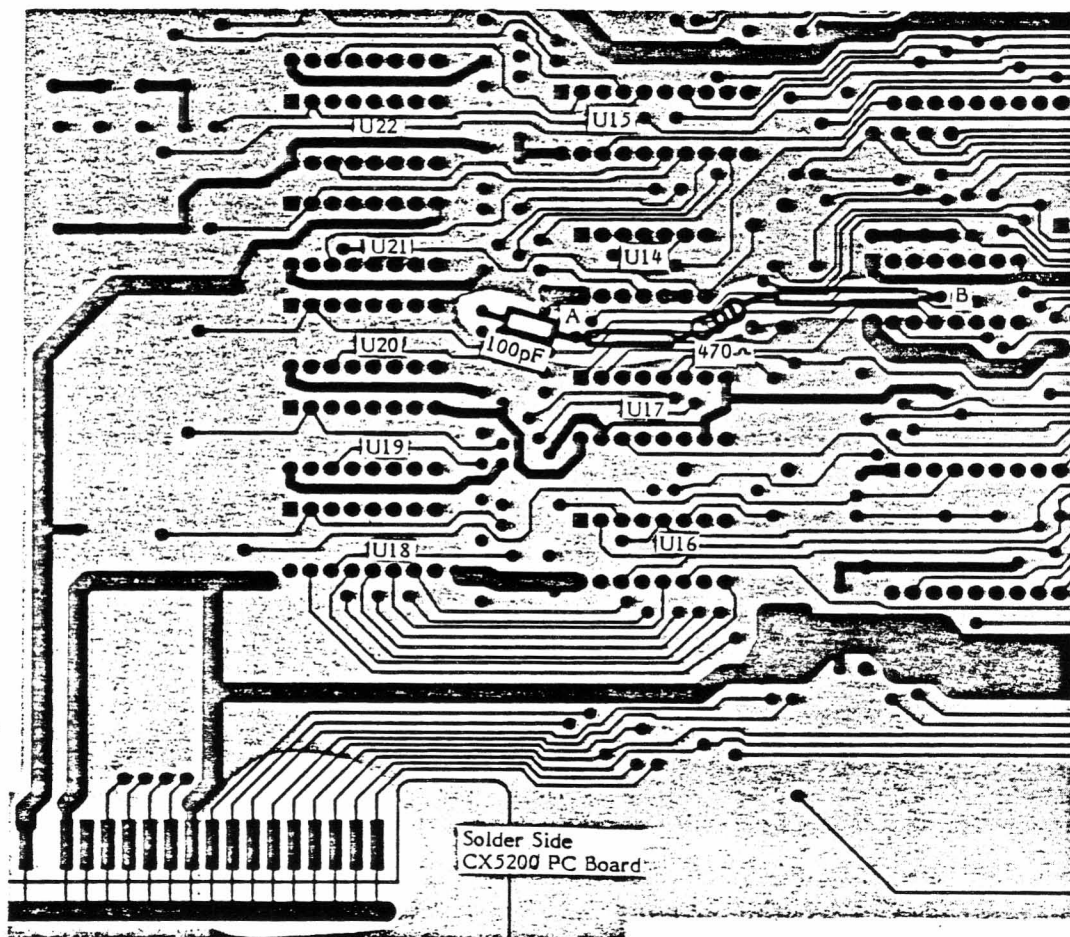


Figure 3. R-C Network (Add to solder side of CX 5200 PC Board)

PROCEDURES:

You will need:

- 1 - 100 pf capacitor (P/N C014180-03)
- 1 - 470 Ω resistor (P/N 14-5471)
- Sleeving (approximately 2" in length)



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TECH TIP

VCS
number 7CONT.

MODEL: CX5200

DATE: 1/20/83

See Figure 3 for the following steps:

1. Straighten the lead of C27 (solder side) and solder one lead of the 100 pf capacitor to it.
2. Point A is an unoccupied well between IC's U14 and U17. It is connected directly to Pin 1 of U14. Cut the trace running between points A and B as close to Point A as possible. Use a DVM to insure that the trace is now open.
3. Add sleeving to one lead of the 470 Ω resistor. Insert the lead into the well at Point A and solder.
4. Wrap the remaining lead of the 100 pf capacitor around the lead of the 470 Ω resistor at Point A and solder.
5. Remove the solder from well at Point B which is directly beneath U6. Add sleeving to the remaining lead of the 470 Ω resistor. Insert this lead into the hole at Point B and solder.

TESTING PROCEDURES

Use standard testing procedures as outlined in the CX5200 Field Service Manual (P/N FD100127, Rev. 2).

DIFFICULTY REPORTING

If you have any questions or need further clarification concerning this Tech Tip, contact the ATARI Tech Line Specialist.

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Consumer Product Service
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TECH TIP

VCS
number 8

MODEL: CX5200

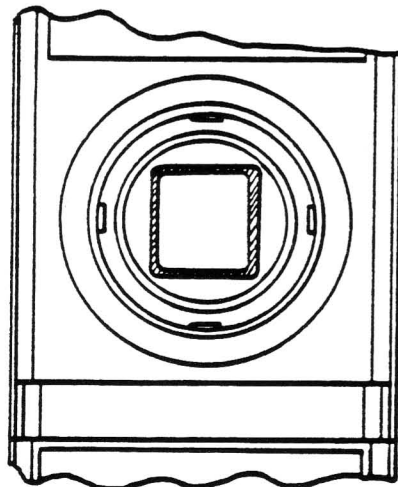
DATE: 1/20/83

SUBJECT: CX5200 Controller

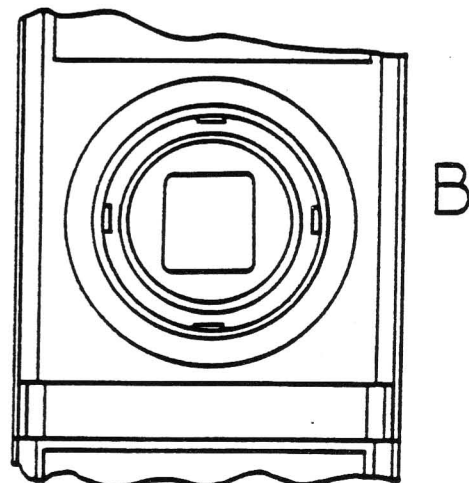
DESCRIPTION:

Repair CX5200 Controllers with damaged boots in the following manner:

- 1) Follow Disassembly instructions for the CX5200 Controller in the CX5200 Field Service Manual.
- 2) Remove the top controller case and pull off the joystick handle.
- 3) Remove the boot retaining ring. Remove and discard the damaged boot.
- 4) If the top controller case contains the square ridge around the access well, as illustrated in "A" below, remove and discard it. Replace it with the new top controller case in which this square ridge has been removed, as illustrated in "B".



Old Top Controller Case



New Top Controller Case

- 5) Insert new boot, retaining ring, and joystick handle.
- 6) Reassemble controller according to the instructions in the CX5200 Field Service Repair Manual.



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TECH TIP

VCS
number 8CON

MODEL: CX5200

DATE: 1/20/83

SUBJECT: CX5200 Controller

DIFFICULTY REPORTING:

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ENCLOSURES:

20 modified top controller cases



Consumer Product Service
Manager of Technical Support
TECH TIP

TT
VCS
09

number

MODEL: 5200

DATE: April 8, 1983

SUBJECT:

5200 Controller Knob Puller Tool

PROBLEM AND SOLUTION:

It has been learned that removal of the 5200 Controller Knob is difficult.

To assist you with this task, a 5200 Controller Knob Puller Tool (FC100214) is now available from our Sales Order Department.

USE AND METHODOLOGY:

This tool is used to easily remove the controller knob without damaging the controller.

Push the knob shaft into one of the corners of the top housing opening. Push down the boot with the tool to expose the shaft. Push the tool toward the shaft until the shaft is inside the notch of the tool's head (See Figure 1). Now, gently lever the tool, and the knob will pop off.

NOTE: By using care, you will not damage the boot during this process.



Figure 1. Controller Knob Removal.

PROBLEM REPORTING:

If you require further information or assistance concerning this Tech Tip, contact the Atari Tech-Line Specialists.

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Consumer Product Service
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TECH TIP

TT
VCS
number **10**

MODEL: 5200

DATE: April 8, 1983

SUBJECT:

New Fire Button (C020501)

PROBLEM:

The fire button on current 5200 controllers have been accused of being "mushy and slow to respond".

SOLUTION:

Atari has designed a fire button which is not mushy and reacts rapidly. This new fire button will replace the old models. When ordering fire buttons use part number C020501.

TESTING AND TROUBLESHOOTING:

There is no change to either maintenance or trouble shooting techniques because of this change.

PROBLEM REPORTING:

If you have questions or require further explanation concerning this Tech Tip, contact your Atari Tech-line Specialists:

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Consumer Product Service
Manager of Technical Support
TECH TIP

TT
VCS
11

number

MODEL: 2600A ATARI Video Computer System

DATE: April 8, 1983

SUBJECT:

Capacitor at C241

DESCRIPTION

The capacitor at C241 may be of the incorrect rating. An easy way to identify a problem capacitor is to look at the screen with the diagnostic cartridge on the COLOR BARS. The screen is grainy with faint vertical bars. (The COLOR BARS look like color squares.)

SOLUTION:

Install part number 21-101224M at C241.

PARTS:

<u>PART NUMBER</u>	<u>DESCRIPTION</u>
21-101224M	.22uf Axial Lead Polycap - 100v.

INSTALLATION PROCEDURE:

Desolder and remove capacitor at C241, and insert and solder 21-101224M into its place.

TESTING PROCEDURES:

Use standard testing procedures as outlined in the 2600/2600A Field Service Manual (FD100133).

PROBLEM REPORTING:

If you have questions or require further explanation concerning this Field Change Order, contact your Atari Tech-line Specialist:

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Consumer Product Service
Manager of Technical Support
TECH TIP

TT
VCS
12

number

MODEL: 5200

DATE: June 6, 1983

SUBJECT:

Printed Circuit Board (CA018087)

PROBLEM AND SOLUTION:

Some 5200 units display a blank dark screen or a screen with garbled information. The probable cause for either of these symptoms is an intermittent solder short (bridge) on the PCB between the A0 Address line trace and the feedthru pad of the REF Line trace (near connector J1).

TROUBLESHOOTING:

The problem has been seen to occur during one of the following three instances:

- 1) When the system is powered-up - the screen is usually blank and dark.
- 2) After the system is powered-up with a cartridge in place - the screen will display random garbled data.
- 3) Either of the above can be seen when the PCB is moved or slightly flexed near connector J1.

SOLUTION:

To remedy the problem, perform the following five procedures in the exact order given:

- 1) Turn off power, and disconnect AC and interconnect cables.
- 2) Disassemble unit to expose the component side of the PCB (CA018087).
- 3) Locate connector J1, the adjacent A0 Address trace and the feed-thru pad of the REF Trace (See Figure 1).
- 4) Carefully remove the excess solder from the pad and wipe the area clean. Inspect the pad and if necessary use an X-acto knife to cut a shallow groove between the A0 Address Line and the feedthru pad. Be very carefully not to nick or cut the trace adjacent to the pad.
- 5) Reassemble and test the unit.



Consumer Product Service
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TECH TIP

TT
VCS
number **12**

MODEL: CX5200

DATE:

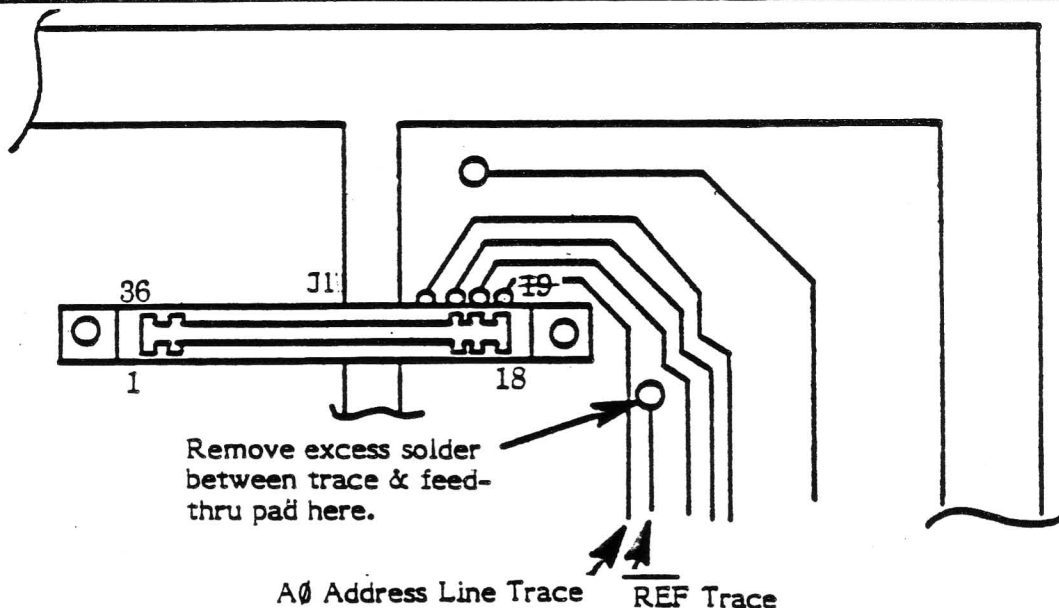


Figure 1. 5200 PCB Solder Side at J1

DIFFICULTY REPORTING:

If you need further clarification concerning this Tech Tip, call the Atari Tech-Line Specialist:

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Consumer Product Service
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TECH TIP

TT
VCS
13

number

MODEL: Atari CX5200™ Supergame

DATE: July 7, 1983

SUBJECT:

Signetics 74LS258AN I.C. (C019052) at locations A16 and A17 on 4-Port (CA020109) and 2-Port (CA021375) PCB's.

DESCRIPTION:

The timing of some Signetics I.C.'s causes RAM information to be distorted. This results in a scrambled screen display or worse - no video at all.

Manufacturing has corrected this problem in some units. However an unknown quantity have been released to the field.

This tech tip is to make you aware of the problem, its manufacturing installed solution, and procedures for your repair of Signetic I.C.'s which cause the display of a scrambled or no video screen.

SOLUTION:

C145 (C014179-24) should be paralleled with another 390pf capacitor (C014179-24) and a 470 Ohm resistor (14-5471) be added from C137 to R134 (See Figure 1).

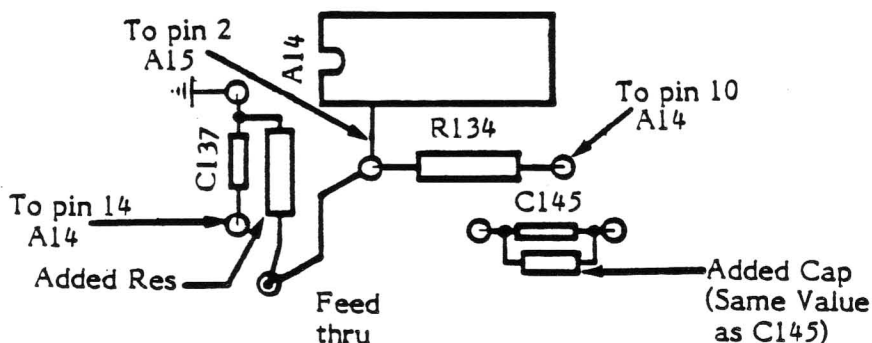


Figure 1. Resistor/Capacitor Fix

If the unit still displays a faulty screen, swapout A16 and A17 with another vendor's component. DO NOT USE A SIGNETICS I.C.

TROUBLESHOOTING AND MAINTENANCE:

These changes do not effect the troubleshooting procedures outlined in the Atari CX5200 Field Service Manual (FD100127).



Consumer Product Service
Manager of Technical Support
TECH TIP

TT
VCS
13

number

MODEL:

Atari CX5200™ Supergame

DATE:

June 22, 1983

DIFFICULTY REPORTING:

If you have any questions or need further assistance, call the Atari Techline Specialist.

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Consumer Product Service
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TECH TIP

TT
VCS
14

number

MODEL: 5200™ Supergame

DATE: July 8, 1983

SUBJECT:

Paddle Jitter on CX5200 PCB (P/N CA018087)

DESCRIPTION:

Some 5200 PCB's demonstrate paddle jitter caused by a ripple on the +5v power supply to the POKEY IC (U7), and an inadequate ground trace at Pin 1 of U7.

SOLUTION:

To eliminate paddle jitter a 10uf capacitor (C017516) must be soldered directly across the +5v and ground legs (Pins 1 and 17) of U7. A sleeved jumper wire must also be connected between Pin 1 of U7 and another ground trace.

MATERIAL:

10uf Tantalum Cap 20v 10%	P/N C017516
16 Gauge Buss wire	2 inches
16 Gauge Plastic Sleeving	4 inches

PROCEDURE:

Perform the following seven steps **ONLY** on those 5200 PCB's which exhibit paddle jitter.

- 1) Trim Capacitor to an overall length of 1 5/8 - 1 3/4 inches.
- 2) Cover the capacitor leads with sleeving. Approximately 1/8 inch of the lead must extend beyond the sleeving for soldering.
- 3) Solder the "+" lead of the cap to Pin 17 of U7 (+5 volts).
Solder to the I.C. Leg
- 4) Solder other cap lead to Pin 1 of U7 (ground). Solder to the I.C. Leg.
- 5) Cover 1 1/4 inches of buss wire with plastic sleeving leaving sufficient length at each end for soldering.
- 6) On the solder side of the PCB solder one end of the sleeved buss wire to Pin 1 of U7. See Figure 1.
- 7) Solder the other end of the sleeved wire to the ground lead of C104. See Figure 1.



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TECH TIP

TT
VCS
14

number

MODEL: 5200™ Supergame

DATE: July 8, 1983

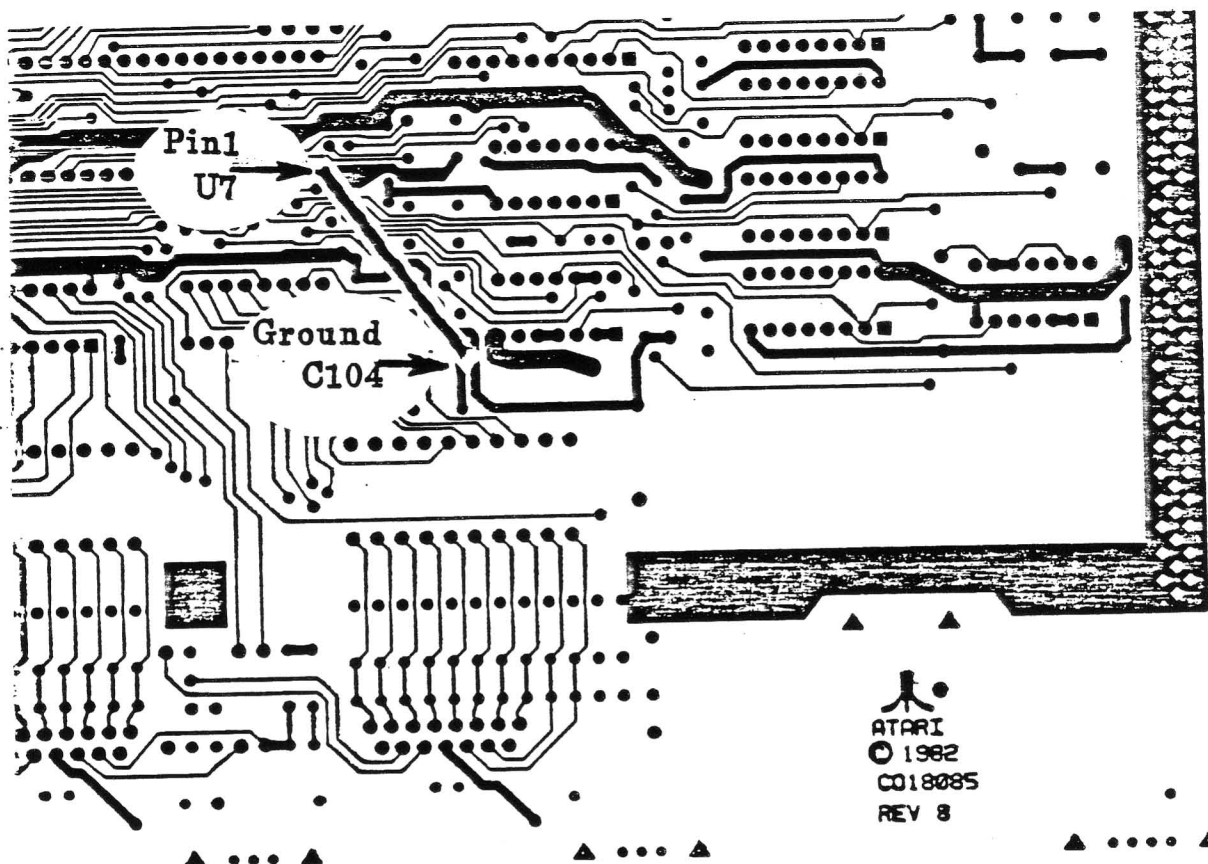


Figure 1. Sleeve Buss Wire Placement

TESTING:

Reassemble unit and test unit with a game cartridge ensuring that paddle jitter no longer exists.

TROUBLE REPORTING:

If you have any questions or need further assistance, call the Atari Techline Specialist.

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Consumer Product Service
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TECH TIP

TT
VCS
15

number

MODEL:

ATARI CX55™ Atari Cartridge Adaptor

DATE:

September 12, 1983

SUBJECT:

Modifying the CX55.

DESCRIPTION

Screen jitters when Ms. Pacman is played.

SOLUTION:

On the solder side of the PCB, use two jumper wires to reroute traces between J1, Pins 15 and 16 and the data bus (See MODIFICATION PROCEDURES).

MODIFICATION PROCEDURES:

On Adaptors which exhibit screen jitter when Ms. Pacman is played, perform the following modifications:

NOTE: Some CX55's may have been modified during production. Use these procedures to make certain the jumpers have not become detached.

1. On the solder side of the Adaptor PCB, carefully cut the traces shown in Figure 1.

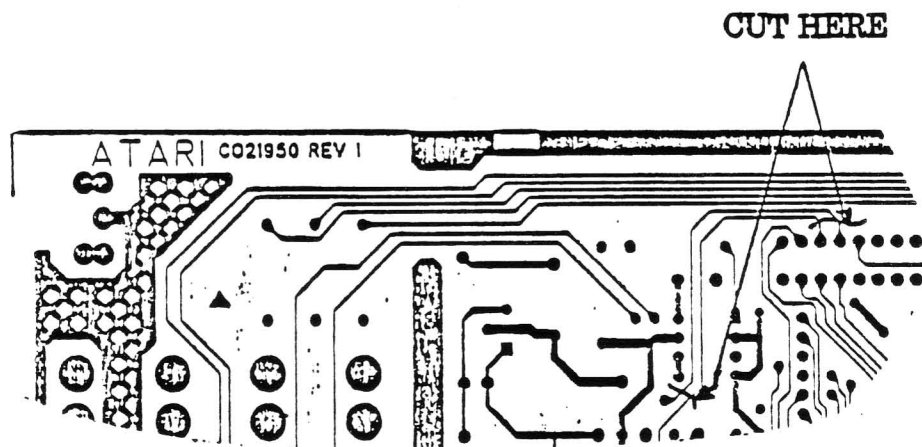


Figure 1. Trace Cuts



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Manager of Technical Support
TECH TIP

TT
VCS
15
number

MODEL: ATARI CX55 Atari Cartridge Adaptor

DATE: September 12, 1983

2. Wrap one end of the jumper wire around Pin 15 of J1, and attach the other end of the wire to the feed-thru identified as A in Figure 2 (below R9).
3. Wrap one end of another jumper wire around Pin 16 of J1, and attach the other end of the wire to the feed-thru identified as B in Figure 2 (near the ends of C12 and R14).
4. Use a non-conductive material and tack the jumper wires to the board. Tack the wires at locations identified as C in Figure 2.

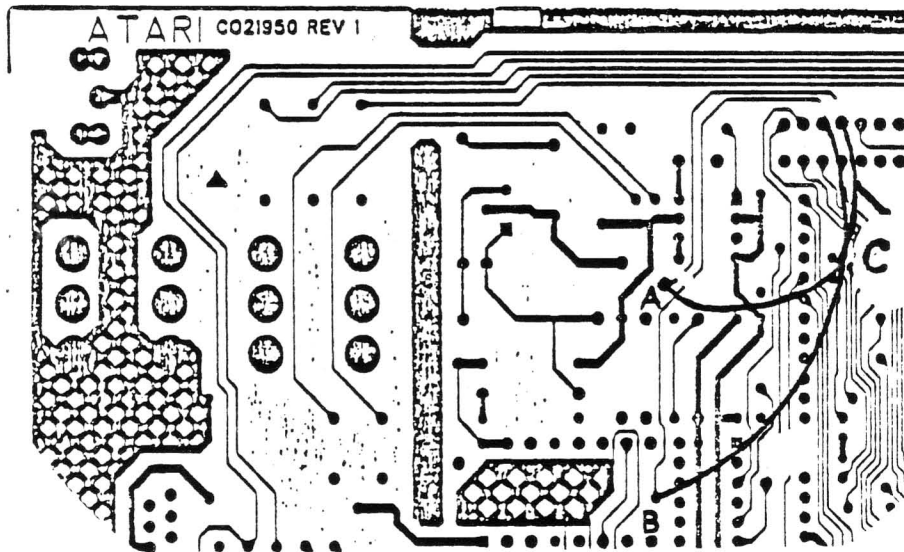


Figure 2. Jumper Wire Placement

TESTING PROCEDURES:

These changes do not effect the troubleshooting procedures outlined in the CX55 Cartridge Adaptor Field Service Manual (FD100570).

PROBLEM REPORTING:

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Page 2 of 2



Consumer Product Service
Manager of Technical Support
TECH TIP

TT
VCS
number **16**

MODEL: Atari 2600A Video Computer System (CA015911)

DATE: August 9, 1983

SUBJECT:

Power-On reset problem of the C010750 (I.C. #6502).

DESCRIPTION:

The unit displays a black screen after it is quickly turned off and then back on again.

SOLUTION:

On those 2600A units which display the problem described above the resistor at R227 must be changed from 24K Ohm (14-5243) to 110K Ohm (14-5114).

PROCEDURE:

Desolder and remove the 24K Ohm resistor from R227, and insert and solder the 110K Ohm (14-5114) into its place.

TESTING AND TROUBLESHOOTING:

This modification does not effect the testing procedures outlined in the 2600/2600A Field Service Manual (FD100133).

DIFFICULTY REPORTING:

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Consumer Product Service
Manager of Technical Support
TECH TIP

TT
VCS
17

number

MODEL:

ATARI CX5200C Two-Port (CA021375)

DATE:

August 2, 1983

SUBJECT:

Additional information to accompany TT VCS 13, dated July 7, 1983.

DESCRIPTION:

Due to the unavailability of 74LS258 (C019052) I.C.'s, some units were manufactured with 74LS158 (C014345) I.C.'s at locations A16 and A17.

When 74LS158 I.C.'s are used the following modifications were performed on the PCB.

1. Traces between Pin 11 and Pin 12 of A15 were cut on both sides of the PCB.
2. Jumpers were installed in the following areas:
 - A. between Pin 11 of A15 and Pin 3 of A27.
 - B. between Pin 1 of A27 and Pin 9 of A14.
 - C. across Pins 1 and 2 of A27.
3. Capacitors C55 and C145 were changed from 390pf to 470pf (C014179-16).

TESTING AND TROUBLESHOOTING:

Troubleshooting A16 and A17 do not change.

The only changes occur when troubleshooting CAS/RAS timing. Using the DESCRIPTION (above), you should have little difficulty identifying the circuit differences.

NOTE: If you must replace A16 or A17, make certain that you replace both I.C.'s with a 74LS258 (C019052).

Circuitry changes required for the 74LS158 do not effect the operation of the newly installed 74LS258's.

DIFFICULTY REPORTING:

If you have questions or require further explanation concerning this Tech Tip, call your ATARI Techline Specialist:

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Consumer Product Service
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TECH TIP

TT
VCS
18

number

MODEL: 5200 POP

DATE: August 11, 1983

SUBJECT:

5200 Retail Demonstrator Keyboard Spacers

DESCRIPTION:

The backing of the telephone-style keypads used on the 5200 Retail Demonstrator have been breaking because of insufficient support.

SOLUTION:

When repairing or replacing a controller assembly, perform the following modification to the controllers keyboard.

Using two Tie Mounting Sticky Back Spacers (FC100604), perform the MODIFICATION PROCEDURES, below:

MODIFICATION PROCEDURES:

- 1) Remove the four nuts and washers that hold the keyboard plate to the control panel.
- 2) Remove the keyboard plate.
- 3) Install spacers (see Figure 1).

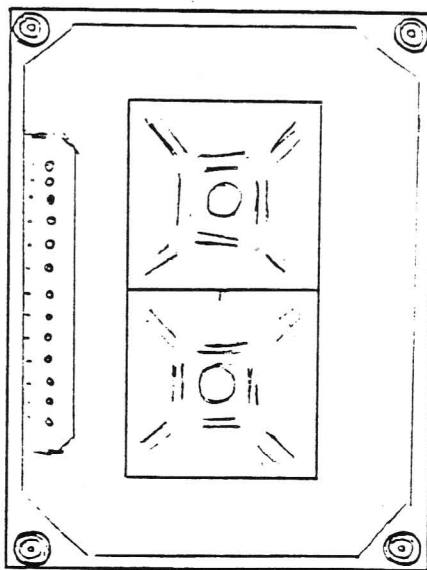


Figure 1. Spacer Installation

- 4) Reassemble the keyboard plate and keyboard.



Consumer Product Service
Manager of Technical Support
TECH TIP

TT
VCS
18

number

MODEL: 5200 POP

DATE: August 11, 1983

TESTING AND TROUBLESHOOTING:

Use testing procedures outlined in the 5200 Field Service Manual (FD100127).

PROBLEM REPORTING:

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Consumer Product Service
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TECH TIP

TT
VCS
number **19**

MODEL: ATARI CX53 TRAKBALL

DATE: October 20, 1983

SUBJECT:

This Tech Tip covers two CX53 problems.

- 1) The metal domes under the fire buttons shift around under the mylar sheeting causing sporadic contact.
- 2) The 12-button keypad or the SELECT keypad slips under the top case.

SOLUTION:

Use eleven ATARI 810™ Disk Drive hole covers (C014106) and place them in the positions on the bottom case shown in Figure 1.

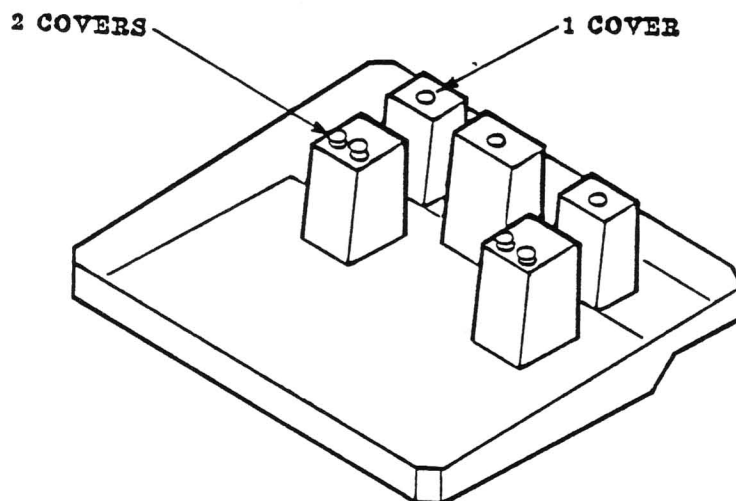


Figure 1. Hole Cover Placement

TESTING AND TROUBLESHOOTING:

This does not change the testing and troubleshooting procedures found in the ATARI CX5200™ Field Service Manual (FD100127 Rev. 4).

PROBLEM REPORTING:

If you have questions or require further explanation concerning this Tech Tip, contact your ATARI Tech-line Specialists:

Inside California
(800) 672-1466

Outside California
(800) 538-1535

